REMARKS

Applicants have carefully reviewed and considered the Office Action mailed on April 24, 2008. Reconsideration is respectfully requested in view of the foregoing amendments and the comments set forth below.

By this Amendment, the specification is revised as suggested by the Examiner and claims 1, 10, 21 and 24 are amended. Accordingly, claims 1-7, 9-14, and 16-26 are pending in the present application.

On page 2 of the Action, the Examiner objected to the disclosure and the claims as explained on page 2. The foregoing amendments to the specification and the claims adopt the Examiner's suggestions. Accordingly, it is submitted that the objections to the specification and the claims are overcome. Withdrawal of these objections is requested.

On pages 3-4 of the Action, claims 1-7, 9-14 and 16-26 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. In particular, the Examiner asserts that "there is no support for the claimed limitation 'the threshold temperature representing the idle state of the chip is determined based on component speed characteristics of the chip at the threshold temperature'". This rejection is traversed.

In paragraphs [0014] - [0018] of the originally-filed specification, the physical phenomenon and interrelationship between voltage, temperature, inherent Si speed characteristics (slow, typical and fast) and how these three relate to transistor speed (component speed) are described. In addition, how minimum voltage and threshold temperature are defined (or derived) are discussed. Thus, it is submitted that anyone having ordinary knowledge in this area (e.g., VLSI, semiconductor, IC integrative circuit, electronics) would understand that the threshold temperature representing the idle state of the chip is determined based on component

speed characteristics of the chip at the threshold temperature.

In paragraph [0014], "component speed" is defined as a "propagation delay of electrical signal within electrical component" where the proper functionality of the electrical component is guaranteed in a certain range of component speed. That is, if the "component speed is too fast or slow, it may cause a functional failure of a component". The specification discloses that "it is important to maintain the component speed in the predetermined range throughout all possible operating conditions such as component temperature, voltage applied to the component and Si material characteristics".

In the paragraph [0015], the specification explains how temperature and voltage influence the component speed. In particular, temperature and voltage influence the component speed in the opposite way: the temperature increase causes reduction in the component speed, while the voltage increase causes increase in the component speed. Therefore, **the component speed can be maintained,** if a temperature decrease is accompanied with the voltage decrease (as the claimed invention proposes). Paragraph [0015] at the bottom of page 5 of the specification states:

> When both the temperature of the chip and the operating voltage decrease, the impact on the time delay or component speed may be reduced or even eliminated and therefore no impact on component functionality is expected, while providing significant reduction in power consumption of the component.

In other words, the minimum allowed voltage and threshold temperature maintain the component speed characteristics of the chip, keeping the chip fully functional, while providing significant reduction in power consumption of the chip.

As explained in paragraph [0017], the electrical component has different inherent speed characteristics (which is an inherent Si property) depending upon the semiconductor material being used and statistical variation of the semiconductor manufacturing process. In particular, Si material characteristics can be divided into three categories with regard to speed: slow, typical

(moderate) and fast. This inherent Si property/characteristic (also called Si skew) interrelates to component speed, voltage and temperature. "In slow material, the electrical signals within the component propagate slower than in the same component made of fast material at the same voltage and temperature conditions". The present specification further explains that "in order to guarantee the specified component functionality in a worst case condition regarding its speed (i.e., when the speed is the slowest), the component is simulated in a so-called slow corner ... with the highest allowed Si junction temperature, the lowest allowed voltage and slow Si material characteristics (Si skew)".

In paragraph [0018] of the specification, the main idea of the claimed invention is stated: "since the timing performance is validated at the slow corner, there is no risk of violating timing specification and therefore affecting component functionality by reducing the operating voltage of the electrical component to some predefined minimum value, when component temperature is below the highest allowed component temperature. [The highest allowed component temperature provides an upper boundary for threshold temperature]. **This minimum voltage value may be determined by direct comparison of the component speed gain due to temperature drop (from the highest allowed temperature to the temperature threshold) and the component speed loss due to voltage reduction to the minimum voltage".** The present specification further explains that when setting a minimum component voltage the following factors should be considered: "voltage and temperature range allowed by Si technology, the Si design library, IR drop on power supplies, voltage regulator accuracy and accuracy of thermal diode or thermometer.

From the above it is clear to one having ordinary knowledge in this area that **the threshold temperature is a such temperature, at which the voltage could be reduced to the**

minimal level without causing violation of timing specification, i.e., without causing the component speed to decrease below the slowest value that was simulated at slow corner (at worst case). The minimum voltage and threshold temperature are interrelated as both determine the component speed as described above. Therefore, one of ordinary skill in the art would understand while setting the threshold temperature the same factors mentioned above should be considered ("voltage and temperature range allowed by Si technology, the Si design library, IR voltage drop on power supplies, voltage regulator accuracy, and accuracy of thermal diode or thermometer"). That is, the predefined threshold temperature is a temperature, at which the operating voltage can be safely reduced, while the component speed is maintained within the timing specification and guarantees the component full functionality.

Paragraph [0024] of the specification describes that "in the idle state, the temperature of the component may approximate the temperature of its environment or ambient." Thus, the temperature (ambient temperature) in the idle state is actually the lowest boundary for threshold temperature. Paragraph [00018] of the specification describes that the predefined threshold temperature is the temperature which the allows the chip to maintain full functionality with reduced operating voltage. As described in the specification, the component speed characteristics at the threshold temperature can be used to determine if the component (chip) is functional at that temperature. Consequently, it is believed that present specification reasonably conveys to one of ordinary skill in the semiconductor art that the inventors, at the time the application was filed, had possession of the claimed invention. Withdrawal of the rejection of claims 1-7, 9-14 and 24 under 35 U.S.C. §112, first paragraph is requested.

Claims 1-7, 9-14, 16-21 and 23-26 were rejected under 35 U.S.C. §112, second paragraph as being indefinite for the reasons given on page 5 of the Action. This rejection is traversed.

It is the Examiner's position that one cannot recite that the threshold temperature is determined based on component speed characteristics at the undetermined threshold temperature. However, the claim recites that "the threshold temperature representing the idle state of the chip is determined based on the component speed characteristics of the chip at the threshold temperature. In other words, the threshold temperature is determined based on the component speed characteristics of the chip as described in paragraph [00018] of the specification. As stated in paragraph [0024] of the specification, one of ordinary skill in the art would have understood that one should be looking at component speed characteristics when the temperature of the component may approximate the environment (ambient temperature) as that is one of the idle states defined in the specification (idle state (e.g., a sleep or low power state) due to less Joule self-heating or due to a drop in ambient temperature - paragraph [0015] of the present specification). In order to remove the alleged ambiguity, independent claims 1, 10, 21 and 24 have been amended to delete the phrase "at the threshold temperature". Accordingly, it is believed that claims 1-7, 9-14, 16-21 and 23-26 are fully definite under 35 U.S.C. §112, second paragraph and withdrawal of this rejection is respectfully requested.

For the above stated reasons, it is submitted that all of the claims are fully definite under 35 U.S.C. §112 and are in condition for allowance. Therefore, it is respectfully submitted that this application be passed to issuance with claims 1-7, 9-14, 16-21 and 23-26.

It is believed that no fee is due, however, the Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 22-0261, under Order No. 31762-221692.

Should the Examiner believe that a conference would advance the prosecution of this application, he is encouraged to telephone the undersigned counsel to arrange such a conference.

Respectfully submitted,

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